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VII. *Extract from Two Letters, dated December 7th and 12th, 1765, from the Rev. Mr. William Borlase, of Ludgvan, in Cornwall, F. R. S. to Emanuel Mendes da Costa, Librarian, &c. to the Royal Society.*

Dear Sir ;

Read March 5, 1766. **O**N board the Spackman tin ship, I have sent a contribution to the fossil collection of the Royal Society, which I beg you will present with my duty and respects to that illustrious body ; it is

# N A T I V E T I N,

a rarity indeed ! and I shall not be easy till I hear it is safely lodged in your Museum, as it is the fairest specimen I have seen.

As the existence of Native Tin is absolutely denied by all mineralists both antient and modern ; and at the time I wrote my Natural History of Cornwall, having no evidences before me to evince the contrary, I contented myself with suggesting, page 185, that its existence was far from being improbable, and in that manner I left the dispute undecided. But a late fortunate discovery, which has furnished me with

three specimens of this metal native, or pure, will now exclude all further doubt.

The account of it is as follows. In the month of May last was found near St. Austle, by some streamers, a large cake, or nodule, of tin ore, weighing about six pounds, irregular in shape, cracked or jagged at the edges, lying about five feet under the surface, and in the middle of that stratum of tin ore, so remarkably spread in the moor adjoining to the forementioned town (*vide* Natural History of Cornwall, page 163). When the lump was broke, it appeared to consist of two coats, or incrustations, surrounding the whole, and of a nucleus or central substance of a quartz intermixed with the purest malleable tin.

The first specimen is now lodged in my desk of Cornish fossils at the Museum in Oxford. The outmost crust was about  $\frac{1}{4}$  of an inch thick at a medium, and of a brownish straw color; the second or inner coat was blacker, closer grained, with some faint appearances of whitish specks interspersed, and about  $\frac{1}{3}$  of an inch thick; these two coats inclosed a third substance, consisting of laminated crystals, rising side by side out of an edging, which shines like melted tin, and lies as it were at their roots coherent to the second coat. These crystalline laminæ are thin almost as the flakes or scales of talc, and being shot in a great variety of directions intersect each other, and leave a vast number of cells, within which are plainly seen, and may be cut freely with a knife, many specks and granules of pure native tin.

The second specimen, which I have the honor to present to the Museum of the Royal Society, is  
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of the same structure, and part of the above-described lump, but is much richer in quality. It was sent me on the 12th of August last by Mr. Henry Rosewarne, of Truro, a gentleman well versed in the knowledge and fusion of metals. Besides all the appearances of native tin taken notice of, in the former specimen, here, in this N<sup>o</sup> 2. we see the malleable tin, in color equal to the finest tin of the furnace, more liberally and distinctly dispersed. The metal is not only found in granules, but in a foliaceous manner issuing out of the quartz, and formed like a thick, jagged, or scolloped lace or edging, of which the specimen itself only can give the justest idea.

The lump, or nodule, of which these two specimens are fragments, was so richly impregnated with tin, that though the best tin ore, in general, will not melt without flux, nor do twenty pounds of black tin usually produce more than fourteen pounds of white, this melted without flux, and twenty ounces produced eighteen ounces of the purest tin.

The third specimen is as follows. On the 17th of July last was found in a stream work near the borough of Granpont, and two days after brought to the above-mentioned Mr. Henry Rosewarne, by Jonathan Crowle, tinner, another lump of the same kind of tin ore as the former; its weight between eleven and twelve pounds; the native tin was inclosed so securely, that, but for the extraordinary weight, it had passed unnoticed. Within the crust, the metal was not in granules, as in the first specimen, nor thin as a leaf, as in the second; but much more abundant,  
and

and in some places more than one inch thick ; but unfortunately the person employed to discover the contents, injudiciously broke the outward crust all to pieces, by which means he got all the pure metal indeed, but prevented that absolute conviction, which this noble specimen would otherwise have conveyed to the doubtful. However, the like structure of the crust, and that of the before-mentioned specimens, and its connexion, to some fragments still in the keeping of Mr. Rosewarne, with the granulated surface, and shotten edge, of the metal, pronounce it, upon comparison, to be native tin.

The crust, inclosing this third specimen, was certain stone of the quartz kind, very hard to break, and exactly the same, to all appearance, with that of the first mass. I employed a tinner dextrous in vanning (a way of breaking and trying ores, by washing them on a shovel gently with water) to try it in his usual way ; he bruised it in my sight, and observed to his surprise, that it suffered no diminution, or decrease, as all other ores do ; that it was very rich in its kind ; that he had never seen any such before ; and that he could not say what metal it contained.

Thus far is the relation Mr. Borlase gives ; but as the existence of native tin is so universally doubted, I thought it necessary, that other proofs than a meer historical account, and the exhibition of only two specimens, and both from the same hand, should be produced to prove it. Mineralists might then doubt whether what Mr. Borlase calls tin, was really that metal, or rather an arsenical marcasite, or other mineral,

neral, which might appear like, or be mistaken for, tin. I thought it very necessary to remove all doubts, by making proper experiments to try if it was tin, before I presumed to communicate it to this learned body; it being so extraordinary a discovery. The experiments I made, and which, I hope, will prove satisfactory, to convince every one that it is really tin, are as follow;

1. It is perfectly ductile and malleable; and, bent between the teeth, gives the same crackling noise as tin always does.

2. In an open fire it melts easily, calcines on the surface, and smokes somewhat; forced in a stronger fire, with borax, it detonates with small phosphorescent sparks, which is a property of pure tin.

3. It is only corroded to a white calx in spirit of nitre, and oil of tartar *per deliquium* being added to the solution, not any thing was precipitated.

It is, therefore, pure Tin.

I am, with great respect and obedience,

Gentlemen,

Your ever devoted,

and most obliged humble servant,

Feb. 20,  
1766.

Emanuel Mendes da Costa.